Department of Mathematics
University of Notre Dame

TOPOLOGY SEMINAR

Guest Speaker: David Reutter
Max Planck Institute

Date: Tuesday, September 1, 2020
Time: 2:30 PM
Location: Zoom
Zoom Link: https://notredame.zoom.us/j/97262637721

Lecture Title:

Semisimple topological field theories and exotic smooth structure

Abstract

A major open problem in quantum topology is the construction of an oriented 4-dimensional topological quantum field theory (TQFT) in the sense of Atiyah-Segal which is sensitive to exotic smooth structure. In this talk, I will sketch a proof that no semisimple field theory can achieve this goal and that such field theories are only sensitive to the homotopy types of simply connected 4-manifolds. In this context, `semisimplicity' is a certain algebraic condition applying to all currently known examples of vector-space-valued oriented 4-dimensional TQFTs, including `unitary field theories' and `once-extended field theories' which assign algebras or linear categories to 2-manifolds. If time permits, I will give a concrete expression for the value of a semisimple TQFT on a simply connected 4-manifold and explain how the presence of `emergent fermions' in a field theory is related to its potential sensitivity to more than the homotopy type of a non-simply connected 4-manifold. This is based on arXiv:2001.02288.

David Reutter - Max Planck Institute